

WHAT IS CLAIMED IS:

1. A stent delivery system for use in target duct or vessels having an acute bend at a known general location in the body of a patient, comprising:

a pusher assembly that includes a pusher member configured to urge a preloaded stent from an introducer catheter into which it is slidably disposed, the pusher member being adapted to engage a proximal end of the stent, the pusher assembly comprising a first and a second tubular portion, at least a portion of the second tubular portion extending distal of the first tubular portion, the second tubular portion including a flexible section, the flexible section having a degree of flexibility that is greater than that of the first tubular section, and a stent-carrying section located distal to the flexible section, the pusher member being located along the second tubular section at point that is proximal to the stent-carrying section and is distal to the flexible section;

the flexible section of the second tubular portion having a preselected length and location along the pusher assembly such that when the pusher assembly and the preloaded stent are disposed within the introducer catheter and are subjected to lateral bending stresses at the known general location in the body, the flexible section of the second tubular portion traverses the known general location in the body, whereby the likelihood of a kink occurring in the introducer catheter is greatest within a region corresponding to the region of greatest flexibility of the pusher assembly.

2. The stent delivery system of Claim 1, further including the stent preloaded within the distal portion of the introducer catheter, the stent further having a proximal end and a distal end.

3. The stent delivery system of Claim 2, wherein the pusher member includes a face having a diameter equal or greater than that of the stent while the

stent is loaded in the introducer catheter, the proximal end of the stent and the face of the pusher member either closely adjacent to, or abutting one another.

4. The stent delivery system of Claim 2, wherein the second tubular portion further includes a stent loading section extending distally from the flexible section to at least the distal end of the stent.

5. The stent delivery system of Claim 2, wherein the stent is a self-expanding stent.

6. The stent delivery system of Claim 1 further including the introducer catheter.

7. The stent delivery system of Claim 1, wherein the second tubular portion has a smaller outer diameter than that of the first tubular portion.

8. The stent delivery system of Claim 7, wherein the second tubular portion comprises a metal-reinforced polymer material.

9. The stent delivery system of Claim 8, wherein the material comprises braided polyimide tubing.

10. The stent delivery system of Claim 1, wherein the second tubular portion comprises a nickel-titanium alloy.

11. The stent delivery system of Claim 1, wherein the second tubular portion includes a distal tip affixed about the distal end of the second tubular portion, and a pusher member affixed to an intermediate point along the second tubular portion that comprises a junction between the stent loading section and the flexible section, the stent loading section and the flexible section comprising a single continuous element, the stent being positioned over the stent loading section such the stent lies between, and is in contact with, both the distal tip and the pusher member.

12. The stent delivery system of claim 1, wherein the pusher member comprises a polymer material.

13. The stent delivery system of claim 12, wherein the polymer material is polytetrafluoroethylene.

14. The stent delivery system of claim 1, wherein the pusher member further comprises a radiopaque filler material.

15. A stent delivery system, comprising:

an introducer catheter having a distal end and a distal portion;

a stent preloaded within the distal portion of the introducer catheter, the stent having a proximal end and a distal end;

a pusher assembly slidably disposed within the introducer catheter, the pusher assembly including both a second tubular portion having a first diameter and a first tubular portion having a second diameter, the first tubular portion being located proximate of the second tubular portion, the second diameter being greater than the first diameter;

a pusher member located along the second tubular portion, the pusher member including a distal face having a diameter equal to or greater than that of the stent preloaded in the introducer catheter, the distal face of the pusher member being disposed adjacent to the proximal end of the stent;

a distal tip affixed about the distal end of the second tubular portion, the stent being tightly held between the distal tip and the face of the pusher member such that during deflection of the stent introducer apparatus, the point along the introducer catheter that receives the largest amount of bending stress and represents the more likely point where a kink would occur, is located proximal the pusher member.

16. The stent delivery system of Claim 15, wherein the second tubular portion comprises a metal-reinforced polymer material.

17. The stent delivery system of Claim 16, wherein the material comprises braided polyimide tubing.

18. The stent delivery system of Claim 15, wherein the second tubular portion comprises a nickel-titanium alloy.

19. The stent delivery system of Claim 18, wherein the second tubular portion further includes a stent loading section extending distal the flexible section, the stent loading section extending distally to at least the distal end of the stent.

20. The stent delivery system of Claim 19, wherein the stent is a self-expanding stent.

21. The stent delivery system of claim 15, wherein the pusher member comprises a polymer material.

22. The stent delivery system of claim 21, wherein the polymer material comprises polytetrafluoroethylene.

23. The stent deliver system of claim 15, wherein the pusher member comprises a radiopaque filler material.

24. A stent introducer apparatus to be slidably disposed within an introducer catheter, wherein the stent introducer apparatus comprises a pusher member for exerting a force on the proximal end of a stent in order to expel the stent from the distal end of the catheter after the stent has been positioned within the distal end of the at least one of the introducer catheter or the stent introducer apparatus, wherein the stent introducer apparatus further comprises a pusher assembly to be mounted within the introducer catheter and to be controllable from the proximal region of the stent introducer apparatus in order to exert the force on the pusher member; characterized in that a distal section of the apparatus and catheter has an increased ability to laterally flex in comparison to the remaining section of the stent introducer apparatus and introducer catheter, the distal section of the apparatus and catheter being at least partially proximal to the stent.

25. The stent introducer apparatus of Claim 24, wherein the distal section extends either proximally from the pusher member to the remaining section, or extends from adjacent to the distal end of the apparatus and catheter to the remaining section.

26. The stent introducer apparatus of Claim 25, wherein any tendency for the distal section to kink during the lateral flexing is compensated for by a second member mounted to the pusher assembly and shaped on its distal surface in such a manner as to enable the second member to open the kink to permit passage therethrough of the pusher assembly.

27. The stent introducer apparatus of Claim 26, wherein any tendency of the distal section to kink or remain kinked during withdrawal of the pusher member and the pusher assembly is compensated for by shaping the proximal surface of the pusher member to open the kink and allow passage therethrough.

28. The stent introducer apparatus of Claim 27, wherein the proximal surface of the second member is also shaped to enable the latter to open the kink and allow passage therethrough.

29. The stent introducer apparatus of Claim 27, wherein the second member is fixed about the distal end of a first tube forming a part of the pusher assembly, the outer part of the first tube conforming to the inner diameter of the introducer catheter and thereby preventing kinking at any position proximal of the second member.

30. The stent introducer apparatus of Claim 29, wherein the pusher assembly further comprises a second tube of significantly less outer diameter than that of the first tube, the second tube being of greater flexibility than the first tube and extending from at least the distal end of the first tube to at least the pusher member.

31. The stent introducer apparatus of Claim 24, wherein the introducer catheter forms part of the apparatus, and includes sections of varying resiliencies.

32. The stent introducer apparatus of claim 24, wherein the pusher member comprises a polymer material.

33. The stent introducer apparatus of claim 32, wherein the polymer material comprises polytetrafluoroethylene.

34. The stent introducer apparatus of claim 24, wherein the pusher member comprises a radiopaque filler material.

35. A stent delivery system, comprising:

an introducer catheter having a distal end and a distal portion;

a stent preloaded within the distal portion of the introducer catheter, the stent having a proximal end and a distal end;

a pusher assembly slidably disposed within the introducer catheter, the pusher assembly including both a second tubular portion comprising a metal braided reinforced polymer tube having a first outer diameter and including a distal end; and a first tubular portion having a second outer diameter and located proximal the second tubular portion, the second outer diameter being greater than the first outer diameter; the second tubular portion further comprising a stent-carrying section and a flexible section located proximal thereof, the stent-carrying section and flexible section divided by a pusher member that includes a face having a diameter equal to or greater than that of the stent preloaded in the introducer catheter; and

a distal tip affixed about the distal end of the second tubular portion, the stent being tightly held between the distal tip and the face of the pusher member such that during deflection of the stent introducer apparatus, the point along the introducer

catheter that receives the largest amount of bending stress is located proximal the pusher member.

36. A stent delivery system, comprising:

an introducer catheter having a distal end and a distal portion;

a stent preloaded within the distal portion of the introducer catheter, the stent having a proximal end and a distal end;

a pusher assembly slidably disposed within the introducer catheter, the pusher assembly including both a second tubular portion having a first outer diameter and including a distal end; and a first tubular portion having a second outer diameter and located proximal the second tubular portion, the second outer diameter being greater than the first outer diameter; and

a pusher member comprising a polymer material, the pusher member being located distal to the second tubular portion and in close proximity with the proximal end of the stent, wherein the likelihood of a kink between the stent and the pusher member, and between the distal and proximal ends of the stent, is reduced.

37. The stent delivery system of claim 36, wherein the polymer material comprises polytetrafluoroethylene.

38. The stent delivery system of claim 36, wherein the polymer material further comprises a radiopaque filler material.

39. The stent delivery system of claim 36, wherein a distal end of the pusher member is in contact with the proximal end of the stent.

40. The stent delivery system of claim 36, wherein a distal end of the pusher member is in contact with the proximal end of the stent and conforms to the proximal end of the stent.